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lished in this discussion may be grouped as follows:

1. *The method of elimination is correct in principle.* Even the advocates of the first-species rule admit this. It therefore follows that, since these two methods are diametrically opposed to each other, one of them *must* be wrong. The inevitable conclusion, therefore, is reached that the advocates of the first-species rule are contending for a confessedly wrong principle.

2. *The method of elimination is in harmony with the law of priority.* It upholds the action of the author who first took out the first species and made it the type of a new genus. In seeking to nullify such action the exponents of the first-species rule are proceeding in direct opposition to the law of priority—the basic law on which, more than on any other, the stability of our nomenclature confessedly depends.

3. *The principle of elimination is embodied in the majority of the codes of nomenclature from the very first.* The advocates of the first-species rule are, therefore, seeking to overthrow a principle that has long been authoritatively recognized and adopted.

4. *The difficulty in elimination is a decided benefit to science.* The subject of nomenclature is altogether too important to be entrusted to the amateur; only the seasoned scientist, who is thoroughly conversant with the literature of the subject, should ever attempt so important a matter.

5. *Elimination is as certain in its results as is the first-species rule.* With a perfected set of rules, any two trained scientists can be depended upon to arrive at the same conclusion in practically every case by the elimination method. The first-species method is not more certain, owing to the fact that in several cases the first species cited was incorrectly identified, and by accepting this name we should thereby be led into an error. Nothing short of an examination of the literature on the subject will secure correct results.

This is the gist of the whole matter. Now, I ask in all seriousness: Can any thoughtful person, having the best interests of science at heart, conscientiously advocate the adoption

of the first-species rule—a rule that is admittedly wrong in principle, that is in direct opposition to the fundamental law of priority, that is also in opposition to the codes of nomenclature that have been officially adopted from the earliest times, and that is liable to lead to erroneous results?

D. W. COQUILLET

U. S. NATIONAL MUSEUM,  
January 29, 1907

#### THE U. S. GEOLOGICAL SURVEY

'THE good of the cause' must ever be held paramount in the estimation of every right-minded worker. It is for this reason alone, as I state from abundant knowledge, that many earnest students of American geology have refrained from going into print on matters of criticism affecting the U. S. Geological Survey. I should woefully regret the necessity of adopting Dr. Branner's conclusion as to the prime reason for the rule of silence among working geologists outside the survey. The best friends of the national organization have not publicly expressed opinions often privately uttered, simply because personal considerations have been held secondary to the progress of science. The field of American geology is so wide and the best possible achievements of one handicapped by other obligations is so limited, that the local investigator and the expeditionary observer learn to heartily welcome honest review of their own work by men better equipped with tools, duly qualified to gather the facts and not less capable of ratiocination, by reason of previous training, breadth of experience and ability to demonstrate and show cause for the conclusions given in their publications.

The recent unfortunate controversy illustrated by the letters of Messrs. Walcott, Branner and Hobbs in the columns of SCIENCE would be deplorable enough under any circumstances, and it might be passed without further remark were it not for several important facts and certain issues which ought not to be longer left in doubt.

1. The undisputed high standing of all these persons, and their many and valuable contributions to American geology, make it incon-

ceivable that the one in command, or either one of the others, could thus publicly discuss a matter involving mere personal issues.

2. The issues joined in the letters themselves do certainly raise questions affecting every American geologist, in or out of the survey, both in his professional capacity and in his relations to the survey as a citizen of the United States.

3. The scope and attitude of the U. S. Geological Survey in its field of work becomes of serious moment if the institution can be justly laid under suspicion of employing its prestige to throttle free discussion.

4. The internal adjustments of the survey as affects its personnel must always have interest to men of science, and it is not a trifling matter when several who have builded their life-work into its structure are compelled to leave it with words of protest.

5. The relation of the survey to other public (state) surveys is also a matter upon which American geologists have an undoubted right, if not a bounden duty, to express opinions freely.

6. The relation of the survey to sporadic workers and others closely concerns every fellow of the Geological Society of America and every geologist who has contributed his mite to the development of this branch of science.

7. The economic aspects of the national bureau and its industrial connections have given cause for more harsh criticism than any other features of its most versatile employment.

The director suggests that discussion can not serve a useful purpose. This is not the first, or second, or third time that this plea, urged by friends of the survey, including the writer, has been used to stem a more or less insistent spirit of adverse criticism. A number of times mild editorials have appeared which would have been followed by more drastic writing had not well-wishers of the survey (by no means its beneficiaries, some even who had suffered injustice from it) interfered successfully in its behalf. Nay more; for many years members of the survey staff have persistently ignored and, directly or by innuendo, thrown a veil of discredit over work

previously done, without offering any evidence to offset it, but, on the contrary, confirming the earlier conclusions and taking the credit therefor. These are plain facts. Yet the sufferers thereby, patiently awaiting the vindication of time, have stood in the breach and fought for the honor of the survey—not for fear of any more harm from the same source, but because their devotion to eternal science transcended all personal and temporary considerations. I state these facts very reluctantly in the hope that the director and his staff may learn from them what useful purpose may be served by a plain, straightforward agitation of this whole question now. It can not harm the survey, but do it unspeakable good, if all be well with its heart and soul, as Mr. Walcott assures us is the case. But, with equal regard for Mr. Walcott, the names and work and characters of Branner and Hobbs and others are so cherished by American geologists that very strong proof must be adduced to convince them that they are now wholly in error.

It is because of the achievements of the survey corps under the present able director, that his most true friends have used their best endeavors to uphold and strengthen his hands in times of inimical attacks, and not always in accordance with the dictates of their own best judgment.

To be more explicit. It is very possible that the art of a politician is more effective in securing ample appropriations from congress than could be any amount of geologic ability. But may it not be equally true that a tithe of the amount thus obtained, if actually applied to geologic research, would accomplish much more in the legitimate field of geology than can now be so utilized?

The expansion of the geological survey to cover fields of questionable appropriateness has notoriously partaken of political claptrap, justified or palliated by the friends of the survey on the ground of expediency only. And the supreme test of this outside work is mainly yet to be applied. In those portions where the knowledge and experience of the practical geologist would appear to be most

essential, there has often been small provision for the searching preliminary investigations demanded by the situation. Studies of the mining fields are numerous, some excellent and thorough, but many have been entrusted to men of little experience, whose results are anything but satisfactory to those who try to use them in actual practise. Almost invariably these reports ignore the accessible but hardly wrought opinions of precedent workers who have successfully applied their observations in hundreds of instances. This method has become so clearly recognized as a 'geological survey habit' that one does not now expect otherwise. The survey has grown to such gigantic proportions that it can not much longer contain itself. It would be better to diminish its scope than to essay the suicidal rôle of autocrat of American science. With a better appreciation of the shortcomings of some of its own crew, whose hasty and superficial work has caused them to guess that they know more than they really have learned, it is probable that the national bureau would raise more enduring monuments than can be possible under existing methods. Studies of regional geology and monographic productions at the hands of the recognized leaders in geology have largely given place to '*omnium gatherum*' publications of temporary and chamber of commerce application.

In conclusion, it does appear to one friend of the survey that the value of the good will and well-deserved support of the ablest workers in geology is of more consequence than the ephemeral and illusive prestige which may enable the organization to ride rough shod over all as supreme arbiter. Such greed of power, if it really exists, as many have long suspected, can not be long concealed. And once it comes out in the open, its death-blow is self-inflicted. The real fear, that thing of which geologists derided by the survey are actually afraid, is that the just outcome of its energy and resources may not accrue to the legitimate ends in view in its original establishment. This question transcends personal considerations, and it certainly is involved to some extent in the recently published discus-

sion which is the text for this communication.

THEO. B. COMSTOCK

LOS ANGELES, CAL.,

January 12, 1907

#### SPECIAL ARTICLES

##### VARIATION IN MOSQUITO HABITS

DURING the summer of 1906, a more systematic series of observations was made on the salt-marsh area near the city of Elizabeth, New Jersey, partly to determine the number of broods, partly to ascertain the relative proportion of *C. cantator* and *C. sollicitans*, and partly to learn more of their migrations.

Generally speaking, we knew that the number of broods varied with the season, and that it was largely a matter of tides and storms as to how many there would be. We knew also that in the southern part of New Jersey *C. sollicitans* was the dominant species, *C. cantator* forming only a small minority early in the season, and that *cantator* was dominant in the northern section at least during the early part of the summer. Concerning the migrations we knew that they occurred; but just how long they were continued and how far they extended was yet a question.

As early as April 19 there was a full brood of larvæ in the pools and these matured before the end of the month. It formed brood I. of the season, was almost all *cantator*, and the adults left the meadow soon after hatching and traveled inland along the valleys of the Rahway and Elizabeth Rivers. On May 2 they were met with in great numbers at Millburn and covered the entire territory between that and the marsh, a distance of about twelve miles in a direct line. This migration was not followed from the marsh directly.

The II. brood was in the pools, already well grown May 10 and reached the adult stage May 15, 80 per cent. *cantator*, 20 per cent. *sollicitans*. It was also a large brood, left the meadow promptly in large proportion, and was followed through the Elizabeth Valley to Elizabeth, Aldene, Salem, Union, Springfield and Maplewood. It also extended all along the first ridge of the Orange Mountains and reached Summit, a distance of fifteen miles